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Art: Transactions of the Cambridge Philosophical Society. Vol. 1, 1822, S. 249–265.
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XVI. *Notice of the Astronomical Tables of Mohammed Abibeker Al Farsi, two copies of which are preserved in the Public Library of the University of Cambridge.*

BY SAMUEL LEE, M. A.

OF QUEEN'S COLLEGE;

PROFESSOR OF ARABIC IN THE UNIVERSITY; AND SECRETARY TO THE CAMBRIDGE PHILOSOPHICAL SOCIETY.

[Read *Nov.* 13, 1820.]

IN making the following communication to the Cambridge Philosophical Society, I have not so much hope of contributing any thing to the stock of science which is already possessed on the subject in question, as of adding something to the history of its progress, and of bringing before the public the names of some men, who appear to have laboured with success in its furtherance: and, until Mr. Sedillot, as announced by Delambre*

* Astronomie du Moyen Age, p. 166. "M. Sedillot se propose de donner des notices plus completes de l'Almageste d'Aboul Wefa, du Manuscrit d'Ebn Schathir, de celui de Leyde, et de tous ceux qu'il pourra se procurer."

It may be proper here to point out a very enormous mistake, which it is probable M. Delambre has copied either from Weidler or Montucla. In recounting the Arabic MSS. found in the Library of Merton College, Oxford, he says, 'Mais, pour prouver avec quelle ardour les Arabes s'adonnaient a l'Astronomie, il ajoute, que dans le seul Bibliotheque Mertonienne

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shall favor the public with his more complete work on the Astronomy of the Arabians, notices, like the present, of such works as are to be found in our Public Libraries, may not be unacceptable. In presenting therefore to the Society a notice of a very scarce and valuable work on Arabian Astronomy, I trust I shall do no more than what some of the most eminent writers on Astronomy have often called for: and, in so doing, it is my intention to avoid prolixity, and to give such details from the Preface of the work in question, and such extracts from the work itself, as may be interesting and useful.

The only notice of the work, here alluded to, is, as far as my researches have gone, to be found in the Bibliotheque Orientale of D'Herbelot, which, from the manner in which it is given, is sufficient to shew that the writer had never seen the work in question. The notice is this, "Zig' Mohammed Ben Abibekr Al-Farsi. Tables Astronomiques composées par Mohammed, &c. pour le Sultan Al-Malik Al-Modhaffer Abou Mansour Joussouf Ben Omar, Seigneur de l'Jemen ou Arabie heureuse.

Cet Auteur dit qu'il a suivi dans son Ouvrage les observations du grand Astronome *Ferideddin Aboul Hassan Ali Ben*

Mertonienne d'Oxford, on conservait plus de *quatre cents* Manuscrits Arabes, tout remplies des doctrines et d'Observations Astronomiques.' Montucla, in his Histoire des Mathemat. Liv. I. Part ii, says, Il nous apprend (i. e. Edovard Bernard) que la seule Bibliotheque de Oxford possède plus de 400 manuscrits Arabes sur l'Astronomie. And, for proof of this, he refers the reader to the Philosophical Transactions for 1694, where not so much as one word is found on this subject. The only work there mentioned, as being connected with Edward Bernard, is a notice of the Catalogus Codd. Manuscriptorum Angliæ et Hiberniæ. I suppose, however, the passage referred to is, Tom. I. Philosophical Transactions, p. 334, which has been cited by Asseman, p. 47, in his account of the Globus Cœlestis Cufico-Arabicus, where, writing to Huntington, Bernard says, "Inter Codices tuos Arabicos in *Musæo Mertonensi* (numeras autem plus quadraginta doctrinæ, et observationis sideralis refertos." The *quadraginta* here mentioned has perhaps been mistaken for *quadringenti*, a mistake certainly of no common magnitude.

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*Abdalkerim Al-Schirvani,** dit *Al-Rassed:* l'Observateur. Il cite encore plusieurs autres Tables Astronomiques, dont voici les titres. *Zig' Al-Mosthi, Zig' Al-Moâdel, Zig' Almohakkem, Zig' Al-Zahir, Zig' Al-Mostanfi, et Zig' Al-Olaï Al-Rassadi,* qu'il dit être le dernier de ceux qui ont observé par eux-mêmes, ce qu'il faut entendre jusqu' en l'année 541. de l'Hég. auquel temps cet Auteur a écrit."

This account by D'Herbelot is erroneous in several particulars: for first, instead of the Zig' Al Mosthi, as given by him, the MS. has Zig' Al Moghni. And again, instead of the Zig' Almostanfi, the MS. has Zig' Almostawfi. And, in the third place, instead of An. 541 of the Hegira, according to D'Herbelot, the MS. has An. 541 of the Æra of Yezdigird: from all of which, it is, perhaps, but fair to conclude, that D'Herbelot had never seen the work of Al Farsi.

It is curious enough that excepting this very imperfect notice by D'Herbelot, the work of Al Farsi seems to have been totally unknown in Europe; and, although Astronomical Tables have been composed in Europe upon the Arabian models, yet it is most likely that these were taken from originals, which Al Farsi has shewn to be incorrect; and on which account, he had been compelled to have recourse to observations made long after those of Albategnius, upon which these tables had mostly been constructed.

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* Soyuti in his Dictionary of Patronymics, which is preserved in the Public Library in the collection of Mr. Burkhardt, says, الشَّرْوَانِي بالفتح والسكون للراء الي شروان مدينة, &c. That is, Sharwáni, with the vowel *a* before *r*, which itself has no vowel, refers to the city Sharwán. In the MS. above alluded to, the vowel *u* is placed before *r*. And D'Herbelot, as well as the Editor of the Kamoos, places *i* before *r*, so that the word is written, Sharwáni, Shurwáni, and Shirwáni. I prefer the first on the authority of Soyuti, and the Author of the Geographical Dictionary entitled معجم ما استعجم, who writes it in the same way.

Montucla, again, in his History of the Mathematics, notwithstanding his having cited several of the Tables, or Ziges, as given by D'Herbelot, has omitted to mention those of Al Farsi, although he might have seen in D'Herbelot, that they were constructed upon an entirely new set of observations.

It is not, however, my intention here to enter into the merits of the Tables in question:—to attempt to shew in what way they are preferable to those that went before them:—or to institute any thing like a comparison with the Tables of modern times. I shall leave these questions to be decided by those who have more leisure and skill for these pursuits, contenting myself with merely bringing to light the work in question.

It is a remarkable fact that two editions of this very scarce work have lain in the Public Library of this University upwards of 160 years: one of which is the work of Al Farsi, the other an abridged edition by some unknown hand; and undertaken, as the epitomator observes in his preface, for the purpose of facilitating the use of the Tables, by reducing them to the æra of the Hegira, the original work having been calculated according to the Persian æra of Yezdigird.*

I shall have no necessity to appeal to the abridged edition of the work in question, as the other MS. is in very good

* The title of Al Farsi's work is, كتاب الزيج الممتحن المعروف بالمظفري رصد الحكيم الفاضل الكامل عطارد الارض جاسوس الفلك ابي الحسن علي بن عبد الكريم الشُروانى الراصد المعروف بالفهاد رحمه الله تعالي وتاليف الفقيه اللوذعي المنوّر خاصه السلطان الملك المظفر بدر الدين محمد ابي بكر الفارسي رحمه الله تعالي. The book of the approved Tables, known by the

preservation, and very accurately written; with this exception, that the diacritical points are very generally omitted, which makes the work of decyphering considerable, and the orthography of some of the proper names irrecoverable. As mention however is made of the original compiler of the tables in the preface to this second edition, I shall take the liberty to transcribe it.* "The most elegant work," says this editor, "that has been published on this subject, (namely, Astronomy) according to the longitude of Yemen, is that of the learned and excellent Mohammed Abibeker Al Fársi, which he published for the Treasury of the Sultán Al Malik Al Modhaffer, and entitled 'Al Zig Al Mumtahan Al Khazáyini." i. e. The approved Treasury Tables. And again, speaking of the mean motion of Mercury, and condemning the practice of some who had gone before him, he mentions another work of Al Fársi in the following terms.† "He

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the title Al Modafferi, from the observations of the learned and excellent, &c. Abi Al Hassan Ali Ibn Abd Al Karím Al Shurwáni, the observer, (better) known by Al Fahhád, &c. Published by the eloquent and enlightened Doctor, for the Sultan Al Malik Al Modaffer, Badar Al Din Mohammed Abibeker Al Fársi. The MS. is in large quarto containing about 250 pages, and has the class marks G G. 3. 27. It is said, in a note, to have been bought in Mocha, A. D. 1639, for 200 Ryalls of Eight; and, that it was placed in the Library A. D. 1658, by the Executors of Wm. Bretton, B. D. formerly Fellow of Emmanuel College, and afterwards Rector of Clapton in Northamptonshire.

* وان ابلغ ما صنف في ذلك لطول اليمن كتاب الحكيم الفاضل الكامل محمد ابي بكر الفارسي الذي صنفه لخزانة السلطان الملك المظفر وسماه بالزيج الممتحن الخزائني .

† ومن اراد الوقوف علي حقيقة ذلك فليطالع الكتاب الذي الفه الحكيم محمد ابي بكر الفارسي المسمّي معارج الفكر الوهيج في حل مشكلات الزيج .

who wishes to know the truth of what has been said, may consult the work published by the learned Mohammed Abibeker Al Fársi, entitled, "A step for the ardent mind towards solving the difficulties of the Astronomical Tables:" I cite these particulars merely for the purpose of shewing in what repute our Author was held by his learned countrymen; and to preserve the title of one of his works.

I now proceed to the preface of the work itself, which I shall give as faithfully as possible, from the words of the Author; and then the contents of each chapter of the book; and after that, a few extracts from the Tables.

After a religious preamble in praise of God, and the Prophet, which I shall omit, the Author thus proceeds, "The humble Mohammed Abibeker Al Fársi, relying on the favor of the Almighty, affirms, that the most elevating and ennobling pursuit that can occupy the attention of man, is that of Astronomy and the wonders which it possesses: and since, (adds he), it has been my good fortune to have held an office in the service of our Lord and King, the illustrious and excellent Al Modhaffer Al Mansúri, Al Malik Al Modhaffer,* &c.—Yúsuf Ibn Omar Khalíl, Commander of the faithful,* &c.—And since his favors have been continually and plentifully heaped upon me, it became my wish to publish a set of Astronomical Tables, for the Royal Treasury, unlike any that had gone before, and which should remain unimpaired to the end of time. I therefore took, as the most to be depended upon, the mean motions of the Sun, Moon, and Planets, as given from the observations of the learned and excellent Philosopher Feríd Eddin, &c. Abi Al Hassan Ali Ibn Abd Al

* The parts here omitted consist of the mere repetition of terms of respect, which are altogether uninteresting to an European reader.

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Karím Al Sharwáni, the Observer, known by the title *Al *Fahhád*, one of the most celebrated and correct of the learned moderns, and who published several Astronomical Tables, of which the following are the titles: viz. 1. *Al Moghni*, 2. *Al Mohakkam*, 3. *Al Záhir*, 4. *Al Mostawfi*, 5. *Al Moáddal*, and 6. *Al Olăi Al Rassadi*, which is the last published by him from observations. I took this last, on several accounts, because, for instance, the accuracy of the calculations, and the demonstrations on which they were founded, were superior to any that had gone before; and because it was compiled at a time much nearer that in which the observations had been made, than any other. The date of these observations is that of †541 of the æra of Yezdigird. It has been related that Al Sharwáni continued to make and correct his observations on the mean motions of the Planets, through a space of not less than 30 years, which he did by instruments, either made by his own hands, or procured from distant places for that purpose. The instruments alluded to are, the Armilla, which is used for the purpose of ascertaining the longitude and latitude of the Planets. ‡The Dhát Al Shuabatein, with which the (Zenith) distances of the Planets, and their diameters are observed:—and the quadrant, used to ascertain the Sun's declination, which was divided into 5400 minutes, equalling the minutes contained in a

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* Pardum (domans B. in Av.) instituens ad venationem. Castell. Lex. Hept.

† See the above mentioned notice by D'Herbelot.

‡ There is no mention made of this word in any of the Dictionaries or Vocabularies, which are all extremely defective in terms used in the Sciences: the words are ذات الشعبتين i. e. *having two branches:* the etymology of the word, and the description of the uses of this instrument, which is given in the text, clearly shew that it was a species of the instrument invented by Ptolemy for the determination of the Moon's parallax, and which was used by Albategnius in the determination of the obliquity of the ecliptic: it was known to Copernicus and the Astronomers of his age under the name of *Regulæ Parallacticæ*, and was first abandoned by Tycho Brahè.

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quadrant of the heavens, used for the purpose of correcting the observations.

Nor did Al Sharwáni depend on the observations of those who had gone before him, seeing as he did the great error and confusion that prevailed among them; and which attached itself, not more to the observations made by Hipparchus and Archimedes, before the time of Ptolemy, than it did to those made by them and Ptolemy himself. The same is true with respect to the observations of Ptolemy and those of the moderns, who followed the Tables called *Almumtáhan, (approved). Now, between the times in which the observations of Hipparchus and Ptolemy were made, there intervened a space of about 260 years; and between the times of the Observations of Ptolemy, and those of the moderns made in the time of Mámoon a space of about 700 solar years. And in the same manner did those who followed the approved Tables disagree, so that one seemed to oppose the other.

Of these Authors were the following: namely, Thábet Ibn Korra: Ahmed Ibn Mohammed Al Nahawéndi the Arithmetician: Isaac Ibn Honein: Hámid Ibn Ali Al Wásiti: †Abu Moasher Al Balkhi: Mohammed Ibn Jábir Ibn Senán Al Batáni (Albategnius): Send Ibn Ali: Khálid Ibn Abd Al Malik Al Marúrúdhi: Ali Ibn Isá Al Astralábi: Abás Ibn Saíd Al Jauhari: Ahmed Ibn Abd Allah the Arithmetician: Ali Ibn Isaac Ibn Kíshoor: Moosa Ibn Shákir, and his three Sons, Mohammed, Ahmed, and Al Hassan: Sáhal Ibn Bashar Al Maháni: Al Kásim Ibn Abd Allah: Ahmed Ibn Abd Allah Habash: Abu Kásim Ali Ibn Al Hosein Ibn Isá Al Sharíf Al Hoseini, known

* By some termed the Tabulæ Probatæ; and by Mr. Caussin, Table vérifiée. Notices et Extr. Biblioth. du Roi. Vol. VII. p. 96. notes.

† There is a work on Astrology with Astronomical tables by this Author in the University Library marked Gg. 3. 19.

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generally by Ibn Aálam: Al Fadl Ibn Hátim Al *Nairizi: Mohâmmed Ibn Ahmed Yúsuf Al Samarkandi: Abu Al Hassan Ali Ibn Amâjur Al Turki: Yahya Ibn Abi Mansúr: †Ali Ibn Abd Al Rahmân Ibn Ahmed Ibn Younis: and Abu Al Hassan. The observations of all of whom differed from one another; and each of whom published a set of Tables from such materials as he had before him, and which he considered as sufficiently accurate.‡

§ It is related by Ali Ibn Abd Al Rahmân Ibn Ahmed Ibn Younis, as told him by Send Ibn Ali, respecting Ibn Yahya Ibn Abi Mansúr: namely, that Ibn Yahya's observations could not be correct, nor have arrived to that degree of accuracy that could be wished, as he had seen the Armilla with which they had been made, sold, some time after his death, in the street of the Paper-makers in Bagdad; and that it was divided into parts of 10 minutes each: This, says the Author, is a proof that his observations with this instrument were not perfect, on account of its being divided into parts which were sixths of a degree: but if its divisions had been of one minute each, they would have been perfectly correct.

It is related by the learned and excellent Abu Al Hassan Ali Ibn Abd Al Karím Al Sharwâni the Observer, above mentioned, that he found the mean motions of the Sun and Moon agreeable to the observations of Yahya Ibn Abi Mansúr, and those of Khâlid Ibn Abd Al Malik Al Marúrúdhi:—of Abbas

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* In the orthography of this name I have followed Mr. Caussin, who says he was a native of Naïriz in Persia, and was famous for his knowledge of Geometry and Astronomy. Notices et Extr. Vol. VII. p. 118.

† Of whose work an ample extract is given by Mr. Caussin in the Notices and Extr. Vol. VII.

‡ From p. 60 et seq. of the Volume alluded to Ibn Younis makes the same remark.

§ The passage here cited from Ibn Younis, is found in Mr. Caussin's edition above alluded to.

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Ibn Saíd Al Jauhari, and of Habash, all of which agreed with one another in this particular.

But with respect to the two superior Planets: viz. Saturn and Jupiter, it was found in the Tables called Al Olāí Al Rassadi (composed by Sharwáni) that a conjunction would take place in Capricorn, in which the one would appear to touch the other, and which would happen on the * 14th of Safar, 562, of the Hejira, that is, on the 6th of Bahman Máh, ann. † 535 of Yezdigird: and it so happened; so that the calculation agreed with the fact; which was not the case with any other of the Tables that had been published from observation; but, on the contrary, the event universally contradicted the prediction: which may be sufficient to vouch for the accuracy of Al Sharwáni.‡

It is further related, that Al Sharwáni observed the mean motions of Mars, through a long space of time, and found them agreeable to the observations of Ibn Aálam. He likewise observed for a long time the mean motions of Venus, when she came in conjunction with the star in the heart of Leo, which he also found agreeable to the observations of Ibn Aálam.

But with respect to the real motions of Venus, and the place of her apogee, he found some difference between his own observations, and those of others who had gone before him: for, according to him, the apogee of Venus would differ from that of

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* Corresponding to Nov. 30, 1166, A. D. which also corresponds to 535 of Yezdigird as given by Gravius in the Epochæ celebriores. See Tables.

† This æra, according to Gravius, Epochæ Celebriores, began A. D. 632, which is the year in which Yezdigird ascended the throne of Persia.

‡ It is worthy of remark that the complaints of Ibn Younis were to the very same effect: viz. that in his day, none of the observations corresponded in time and quantity with the predictions, whence we may infer that the science of Astronomy, had received considerable improvement from the labours of Al Sharwáni. See Mr. Caussin Not. et Extr. p. 122, et seq.

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the Sun in degrees, though it would be in the same sign; which is contrary to the general opinion of Astronomers.

Again, with respect to the true motion of Mercury, after repeated observations, he found it to differ from the observations of all but those of Ptolemy, with which it agreed. On these accounts (says Al Fársi) I relied entirely on his observations, because of their great accuracy and the clearness of their demonstrations, and because I had proved them during a considerable length of time, by the conjunctions of the planets one with another, or with one or other of the fixed stars; as, for instance, with the star in the heart of Leo, and others; as well as the quantity and time of duration of the Solar and Lunar eclipses; in all of which I found the prediction to correspond with the event.

I found, moreover, (continues Al Fársi) that most of those who had gone before me, and had composed Tables, had formed them upon the observations of others, as in the case of *Kúshiár, author of the Tables called Al Jámia; Mohammed Ibn Ayúb, author of those styled Al Mofrid; and Ali Al Nasúi, author of those called Al Fákhir;—and Abi Rashíd Al †Barabshi, author of those called Al Kámil, all of whom implicitly relied on the mean motions of the Planets, as given by Al Batáni (Albategnius) taking all the errors and mistakes just as they found them.‡

When therefore I knew the character of the different Tables that had come down to my times, and found none comparable to

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* There is a work on Astrology by this Author, bound up in the same volume with the work of Al Fársi.

† It is impossible to be certain of the orthography of this word from the Manuscript, which here omits some of the diacritic points: thus البرابشي.

‡ We have here a further account of Tables of which D'Herbelot has taken no notice when speaking of Al Farsi, which it is most likely he would have done had he ever seen this work: and it is doubtful whether a notice of any one of them is to be found in D'Herbelot.

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those called Al Oläí Al Rassadi, either as respects their accuracy, or the nearness of the time of their compilation to that of the observations on which they were founded, I took this, with some degree of confidence, as the basis of my own, which I published as conformably as may be to his models, facilitating, at the same time, the work of calculation as much as possible; and which had formerly been attended with considerable difficulty. I then gave my work the title of Al Zíg Al Mumtáhan Al Modhafferi, i. e. The approved Tables of Modhaffer, according to the name of our Sovereign Al Malik Al Modhaffer, (may his reign be perpetual.)

The epoch of all the elements of the mean motions of the Planets, and of the equations of their apogees in these Tables, I laid down for the beginning of the year 631 of Yezdigird, on the third day of the week at twelve o'clock, which answers to the 17th day of Safar An. Hej. 661.* And the extent of time for which they are formed is An. 1321 of Yezdigird. The place, moreover, according to the longitude and latitude of which these Tables are computed, is the point of the great circle determining the climate of Yemen, the longitude of which eastward from the Canary Isles, is 63° 30′, and the latitude, from the Equator northward 14° 30′, which determines the boundaries of Yemen, upon which these Tables have been formed.†

I further affirm, (continues Al Farsi) that no one has, in our times, published Tables at all to be compared with these, nor will

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* Which answers to Dec. 13, A. D. 1262.

† In a note written between the lines in this place of the MS. it is said وهذه البقعة هي مدينة صنعا اليمن لان هذا المذكور طولها وعرضها "This place is the city of Sená in Arabia felix, as this is the longitude and latitude given of that place." This, upon referring to the Tables I find to be the case, which is sufficient to determine the place where Al Farsi wrote.

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any come hereafter who will equal them, whether as regards their truth, or the accuracy of their construction, excepting only, where some error might have escaped the compiler from absence of mind, either in laying down the numbers in the letters of the alphabet, or in making the computations. My apology is therefore made, and my intention known. No one, it should be remembered, is free from error, especially when beset with difficulties, except the Almighty, whose favor and furtherance I have supplicated in the prosecution of this work, and I am not without confidence that he has answered my requests. I have divided these Tables into 40 chapters, which are as follows.

The number of Chapters in these Tables.

Chap. 1. On Chronology. 2. To find an unknown from a known date, by the Tables. 3. To find the beginning of the Roman, Coptic, Arabian, and Persian year. Also to find the beginning of the year and months of the Jews by the Tables. 4. To find the embolisms of the Arabian and Roman years by the Tables. 5. Explanation of the Elements, to which the mean motions of the Planets, (the Sun and Moon, with their true motions,) are reduced in these Tables; and to find any one for any given time. 6. To rectify the difference of time at any place differing in longitude from that wherein these Tables have been composed, which is in the climate of Yemen. 7. To find the length of Day and Night, for any given time by computation and the Tables. 8. Explanation of the requisites for a calculator in using the mean motions of the Sun, Moon, and Planets, and their equations, as laid down in these Tables: also their true motions. 9. To find the Sun's place. 10. To find the Moon's place. 11. To find the place of the Nodes. 12. To find the places of the five Planets. 13. On the retro-

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grade motions of the Planets:—and their being stationary. 14. To find the latitude of the three superior Planets. 15. To find the latitude of the two inferior Planets. 16. * To find the Sun's declination: also to find the first and second declination by calculation. 17. To find the Moon's latitude. 18. To find the times of the Conjunctions and Oppositions. 19. To find the places of the Conjunctions and Oppositions. 20. To find the Phases of the Moon. 21. To find the sine, the arc being given; and *vice versa*. 22. To find the versed sine, the arc being given; and *vice versa:* also to find the chord, the arc being given, and *vice versa*. 23. On the ascension in a right sphere. 24. On the ascendant, and how to find the parts of the hours of day. 25. To find the Sun's altitude from the tangent and cotangent of observation; and *vice versa:* also to find the reversed shadow (i.e. the cotangent) commonly in use. 26. To find the Equation of the time of day (at any given place): also the places of the Sun and Planets by computation and the Tables. 27. To find the latitude of any place by an observation of the Sun's altitude, and by the Tables. Also to find the longitude of any place and its meridian. 28. To find the ascendant; also the circle of the Heavens corresponding to the latitude of Yemen, from the observed altitude of the Sun. 29. To find the ascendant; also an arc of the Heavens from the observed altitude of the Planets. 30. To find the parts of the ascendant: also the point of the Ecliptic that is upon the Meridian, the common and sidereal time being given. 31. To find the time when any point of the Ecliptic comes to the Meridian, either at a place having latitude, or in one that has none. 32. To find the Equation for the centre points of the twelve signs of the Zodiac. 33. To determine the cases wherein the solar Eclipses take place,

* For an explanation of what is meant by first and second declination, see Delambre Ast. du Moyen Age, p. 158.

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by computation and the Tables. 34. To calculate a solar Eclipse. 35. To calculate a lunar Eclipse. 36. On the *Comet; and to find its place with respect to the Ecliptic. 37. To find the hours of the day as equated for the latitude of Yemen, by the Tables. 38. To find the greatest Meridian altitude for the latitude of Yemen, by the Tables. 39. To find the conjunctions of the Planets one with another: also the times of the conjunctions of the Moon with the Planets. 40. To find the places of the fixed Stars for the epoch of these Tables, i. e. for the beginning of the year 631 of Yezdigird: also to find the places of the 28 stars of the Ecliptic from their original places: which ends the Tables.

The following are two Tables giving the mean places of the Planets, and their Apogees, which may have been influenced by the observations of Sharwáni.

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* The word used in the text is الكيد, of which the Author himself says, اعلم ان الكيد من كواكب ذوات الاذناب وليس هو في افلاك الكواكب وموضعه في الفلك الاثير ما دون فلك القمر Observe that الكيد is one of the stars having a tail, not situated in the firmament of the stars: but having its place in the etherial heaven, below that of the moon. I have therefore supposed it must mean a Comet, no assistance whatever, in this, as well as innumerable other instances, being to be obtained from the Dictionaries; but the Author speaks of this comet as if it were a solitary phænomenon, and subject to the same laws of motion as any of the planets; he has given tables of its mean place in the ecliptic for intervals of 1 year, of 10 years, and of 100 years; a proof, if any were wanted, of the very little attention which was paid to observation in the construction of their tables.

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Table of the MEAN PLACES *of the* PLANETS, *for the beginning of the Year* 631 *of Yezdigird, for the Longitude of* 60° 30′ *from the Canary Isles, Eastward.*

Planets.	Signs.	Deg.	Min.	Sec.
The Sun's mean place	6*	28°	38′	22″
The Moon's ditto	5	2	14	29
Its true place	5	27	34	22
The Nodes	11	38	7	6
Saturn's mean place	4	12	39	8
Its true place	9	5	28	14
Jupiter's mean place	4	8	30	13
Its true place	11	19	55	9
Mars' mean place	2	25	23	57
Its true place	2	16	5	25
Venus's mean place	7	10	14	22
Its true place	1	38	45	52
Mercury's mean place	2	26	49	22
Its true place	11	55	7	31

Table of the APOGEES *of the* PLANETS, *for the year above mentioned.*

Planets.	Signs.	Deg.	Min.	Sec.	Thirds.	Fourths.
The Sun....	*Pisces	2°	29′	12″	30‴	5^{iv}
Saturn	Sagittarius..	8	9	23	30	0
Jupiter	Virgo......	5	29	5	30	5
Mars	Leo	4	16	6	30	0
Venus	Gemini	2	17	16	30	0
Mercury	Scorpio	7	0	41	30	0

* This is evidently a mistake in the manuscript, as the right sign Cancer is always mentioned in other parts of the Tables.

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The positions of the Apogees given in this Table do not accord with those given by Ibn Younis in the year 220 of Yezdigird, and much less with their true places for that time, as determined by modern tables: and, the case of the Sun excepted, their planetary theory would necessarily give results essentially different from the true ones.

The obliquity of the ecliptic is always made 23° 35′, the determination of it given by Albategnius, and adopted by all subsequent Arabian Astronomers. The Sun is said to be vertical at Sena when he is in the 9th degree of Taurus, and its latitude is stated to be 14° 30′: this would give a value of the obliquity much less than the preceding: but no inference can properly be drawn from hence, as we know not whether these results were connected with each other.

It may perhaps be unnecessary to give any further extracts from the Tables, I shall therefore only remark, that in the original work they occupy 96 pages; in the abridgement 70. The chapters moreover in the abridgement are confined to 30. It was my original intention to give a list of the principal places in the East with their longitudes and latitudes from the Tables above mentioned: but, as I intend to present to the Society some extracts from the Geography of Abulfeda, of which a very valuable copy, written by Erpenius, is deposited in the Public Library, and which has never yet been laid wholly before the public, I now defer that part of my design to some future day, when the list of Al Farsi, and the extracts from Abulfeda may appear together.

SAMUEL LEE.

Cambridge,
Nov. 5, 1820.

P. S. I must not omit to mention, that I am indebted to the Rev. Mr. PEACOCKE, the present Secretary of the Society, for several valuable hints, during the preparation of this Paper for the Press.

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